DEVELOPING A PARTICIPATORY MODELING PROCESS:
A Rough Guide for Using Collaborative Modeling in Environmental Problem Solving

THE PARTICIPATORY MODELING PROCESS *(based on van den Belt, 2004):*
Step 1: Preparation
> Select & invite relevant stakeholders
> Gather baseline information about the group & their perspectives of the issue

Step 2: Workshops
> **Workshop 1: Introduction**
>> Introductions
>> Ground Rules
>> • Participants' Rights & Responsibilities
>> • Behavioral Guidelines
>> • Strategies to Deal with Conflict
>> • Modeling Guidelines
>> Introduce System Dynamics Thinking
>> • Emphasis is on the relationships within a system or between different subsystems
>> • Feedback loops and time lags are critical in understanding behavioral patterns
>> • Understanding patterns rather than creating accurate predictions is often the primary objective
>> Introduce the Modeling Software (STELLA, Powersim or Vensim)
>> • Question 1: What is the central component of the story? (this should be a **NOUN = STOCK)**
>> • Question 2: What specific actions influence the central component? (These should be **VERBS = FLOWS)**
>> • Question 3: What other issues drive or inhibit the action? (These should be **ADJECTIVES & ADVERBS = CONVERTERS)**

> **Workshop 2: Defining the Problem**
>> Reference Mode of Behavior
>> • What is the history of system?
>> • What specific trends or behaviors have we seen in the past?
>> • What will be our baseline understanding or description of the system?
>> Envisioning / Backcasting
>> • How does the world look when it is perfect?
>> • Share what your agency or organization might see as their "Perfect Future"…
>> Ecological Risk Assessment
>> Scale Issues

		Time	Space	Complexity	Social
Extent		Time Horizon e.g., 1970 – 2020	Global, Regional, Local e.g., a watershed	Diverse issues are included e.g., ecology, hydrology, biology, economy, sociology & culture	Horizontal & vertical integration e.g., interagency & inter-institutional emphasis
Resolution		The Time Step e.g., 1 year, 1 decade, etc.	The level of spatial explicitness, numbers of pixels	Number of model icons e.g., 10 state variables, 25 auxiliary variables, 52 parameters	Number of people involved, institutional networks e.g., 23 people from 8 institutions

Workshop 3: Building the Qualitative Model

Sector Definition
- Define a few areas that encompass the major aspects of the problem
- Broad categories that guide thinking without going on a tangent or digging into details
- For example, if your group is interested in examining "linkages between ecology & economics" you may create a "natural capital" or "ecosystem services" sector

Stocks & Flows – In small groups the participants determine and draw what stocks and flows should be included in each sector.

Feedback Loops & Lag Time – Participants also discuss the various feeback loops and draw arrows to represent such interrelationships

Workshop 4: Building the Quantitative Model

Quantification & Data Gathering
- Develop a list of time-series data requirements
- Experts are invited to contribute and assist in the model building

Calibration – "tuning" the model by manipulating independent variables and parameters to obtain a reasonable match between observed and simulated values

Workshop 5: Testing, Scenarios & Conclusions

Validity & Usefulness of the Model
Building Confidence in the Model
Learning from Scenarios
Sensitivity Analysis
Consensus-based Conclusions & Recommendations

Step 3: Follow-up & Tutorial

Follow-up interviews
Written Report & Final Model
Tutorial – Exploring the model with the participants
Participants practice communicating their results to a wider audience